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COPPER-ZINC ALLOY

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3 Claims. (Cl. 75—155)

This invention relates to metallurgy and more particularly to copper-zinc alloys.

One of the objects of the present invention is to provide an age hardenable copper-zinc alloy.

Another object is to provide a copper-zinc alloy suitable for hot stamping and extrusion operations.

Other objects and advantages will be apparent as the invention is more fully hereinafter disclosed.

In accordance with these objects I have discovered that the hot working properties of copper-zinc alloys, containing from 30 to 35% zinc, balance copper, are materially improved by adding thereto from .20 to 1% Be and from .30 to 2.0% of one of the metals Ni and Co, and that the said Cu.Zn alloys containing Be and one of the metals Ni and Co in the proportions specified on precipitation hardening by heat treatment within the range 220–380° C. will develop a tensile strength of from 90,000 to 125,000 pounds per square inch with an elongation of 37 to 15% and a hardness approximating 95–115 Rockwell B (Rockwell C 32 or Brinell 300).

Heretofore in the art aluminum and nickel additions to copper-zinc alloys have been proposed for the purpose of forming a precipitation hardening alloy. These alloys, however, after a homogenizing heat treatment at temperatures approximating 800° C. are hot worked with difficulty even at temperatures as high as 800–850° C. and are totally unsuitable for hot stamping and extrusion operations at temperatures as low as 650–800° C. By substituting beryllium in amounts ranging from .20–1.0% for the aluminum and using either of the metals Ni or Co in such an amount relative to the Be within the range .30 to 2.0% as to form nickel or cobalt beryllide compounds, I have found that such beryllide compounds may be dissolved substantially completely in the alpha phase of the Cu.Zn alloy on heat treatment at temperatures approximating 800° C. and where so dissolved appear to improve the working properties of the alloy at temperatures within the range 650–800° C. to the extent that such alloys may be readily mechanically deformed by hot stamping and extrusion operations to which the Al-Ni-containing brasses and other brasses are not well suited. Moreover, the alloys subsequently to such hot mechanical deformation may be precipitation hardened without prior heating to about 800° C. for prolonged time intervals to homogenize the structure as heretofore required.

On precipitation hardening I have found that the alloys of the present invention develop materially higher tensile strength and hardness with lower elongation than the Cu.Zn alloy containing Al and Ni as heretofore employed in the art. As an example, of the present invention an alloy containing Zn 30%, Be 1%, Ni .50%, balance copper developed on precipitation hardening a hardness of 98–102 Rockwell B; a tensile strength of about 105,000 pounds per square inch and an elongation of about 20%.

In the Cu-Zn alloy of the present invention it is preferred to maintain the Be content below the solid solubility limit of Be in the alloy at atmospheric temperatures to avoid the precipitation of copper or zinc beryllide at temperatures within the range 400 to 800° C. The solid solubility of Be in the Cu.Zn alloy approximates 1%, however, I prefer to employ between .50 to .75% Be.

The Ni or Co content in the alloy may vary widely within the range .50 to 2.0% without material effect upon the precipitation hardening properties of the alloy with any given Be content within the range .50 to .75%. The rate of precipitation hardening, however, normally increases with increase in the Ni or Co content within this range and the maximum hardness increases with increase in Be content within the range .2 to 1.0% from a hardness approximating 95, Rockwell B to a hardness approximating 115 Rockwell B. The tensile strength increases with decrease in Be content within the range .20 to 1.0% from a tensile of about 125,000 pounds per square inch to a tensile of about 90,000 pounds per square inch.

From the above description of the present invention it is believed apparent that the same may be widely varied without essential departure therefrom and all such modifications and adaptations thereof are contemplated as may fall within the scope of the following claims.

What I claim is:

1. A copper-zinc alloy containing 30 to 35% Zn, .20 to 1.0% Be, from .30 to 2.0% one of the metals Ni and Co, balance copper.

2. A precipitation hardenable and hot workable copper zinc alloy, said alloy containing Zn 30 to 35%, Be .50 to .75%, Ni .30 to 2.0%, balance Cu.

3. A precipitation hardenable Cu-Zn alloy, said alloy containing about 30% Zn, about 1% Be, about .50% Ni, balance copper.

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